

CLAIMS

1. A method of providing a multimedia data service, for user equipment which is capable of movement amongst a plurality of cells served by respective base stations of a radio access network, the method comprising:
- 5 providing the multimedia data service to each of said cells (a) on a point-to-multipoint basis without requiring a Radio Resource Control connection, (b) on a point-to-multipoint basis while requiring a Radio Resource Control connection, or (c) on a point-to-point basis; and
- 10 controlling at least one Radio Network Controller such that, when a user equipment moves from a first cell to a second cell, a suitable connection is established in said second cell to allow said user equipment to receive the multimedia data service.
2. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the method comprises:
- 15 sending a SIGNALLING CONNECTION RELEASE INDICATION message from the user equipment to the serving Radio Network Controller.
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3. A method as claimed in claim 2, wherein the SIGNALLING CONNECTION RELEASE INDICATION message indicates the movement of the user equipment into said second cell as the cause of the request.
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4. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the method comprises:
- 30 releasing the Radio Resource Control connection of said user equipment, such that said user equipment no longer requires a serving Radio Network Controller; continuing point-to-multipoint transmission of the multimedia data service data from a controlling Radio Network Controller for said user equipment; and
- 35 releasing an Iu interface between a previous serving Radio Network Controller and said controlling Radio Network Controller for said user equipment.

5. A method as claimed in claim 4, further comprising:
determining whether said previous serving Radio Network Controller still requires
a bearer connection to receive said multimedia data service data; and
5 if not, releasing said bearer connection.
6. A method as claimed in claim 1, wherein, when the user equipment moves from a
first cell in which the multimedia data service is provided on a point-to-multipoint basis
without requiring a Radio Resource Control connection, to a second cell in which the
10 multimedia data service is provided on a point-to-multipoint basis while requiring a
Radio Resource Control connection, the method comprises:
sending a request for a Radio Resource Control connection from the user
equipment to the serving Radio Network Controller.
- 15 7. A method as claimed in claim 6, wherein the request for a Radio Resource
Control connection indicates the movement of the user equipment into said second cell
as the cause of the request.
8. A method as claimed in claim 1, wherein, when the user equipment moves from a
20 first cell in which the multimedia data service is provided on a point-to-multipoint basis
without requiring a Radio Resource Control connection, to a second cell in which the
multimedia data service is provided on a point-to-multipoint basis while requiring a
Radio Resource Control connection, the method comprises:
establishing a Radio Resource Control connection for said user equipment; and
25 said user equipment directly contacting a core network to trigger activation of the
multimedia data service for said user equipment.
9. A method as claimed in claim 8, wherein said user equipment contacts said core
network by means of a Routing Area Update message.
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10. A method as claimed in claim 1, wherein, when the user equipment moves from a
first cell in which the multimedia data service is provided on a point-to-multipoint basis
without requiring a Radio Resource Control connection, to a second cell in which the
multimedia data service is provided on a point-to-multipoint basis while requiring a
35 Radio Resource Control connection, the method comprises:

establishing a Radio Resource Control connection for said user equipment, such that said user equipment requires a serving Radio Network Controller;

said user equipment directly contacting a core network to trigger activation of the multimedia data service for said user equipment; and

5 establishing an Iu interface between a serving Radio Network Controller and a controlling Radio Network Controller for said user equipment.

11. A method as claimed in claim 10, further comprising:

10 establishing a bearer connection from the core network to said serving Radio Network Controller for multimedia data service data; and
transmitting the multimedia data service data on a point-to-multipoint basis from said serving Radio Network Controller.

12. A method as claimed in claim 1, wherein, when the user equipment moves from a
15 first cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the method comprises:

20 detecting in a serving Radio Network Controller that the Radio Resource Control connection is no longer required.

13. A method as claimed in claim 12, wherein the step of detecting in the serving Radio Network Controller that the Radio Resource Control connection is no longer required comprises:

25 performing an attach from the serving Radio Network Controller to a drift Radio Network Controller; and
said drift Radio Network Controller informing said serving Radio Network Controller that it is already providing the multimedia data service without requiring a Radio Resource Control connection.

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14. A method as claimed in claim 12, wherein the serving Radio Network Controller informs the user equipment that it should receive the multimedia data service data on a point-to-multipoint basis.

15. A method as claimed in claim 12, wherein the serving Radio Network Controller informs the user equipment that it should release its existing radio access bearer for the receipt of the multimedia data service data on a point-to-point basis.

5 16. A method as claimed in claim 12, wherein the serving Radio Network Controller informs the user equipment that it should release its existing Radio Resource Control connection.

10 17. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the method comprises:

15 detecting in the user equipment that the Radio Resource Control connection is no longer required.

18. A method as claimed in claim 17, wherein the step of detecting in the user equipment that the Radio Resource Control connection is no longer required comprises monitoring the multimedia data service SIB.

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19. A method as claimed in claim 17, further comprising releasing the existing Radio Resource Control connection.

20. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is also provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the method comprises:

25 the user equipment reading the broadcast information relating to the multimedia data service and tuning to a channel on which the data is being transmitted.

30 21. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is also provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, the method comprises:

the user equipment performing an RRC Connected mode cell change, reading the broadcast information relating to the multimedia data service and tuning to a channel on which the data is being transmitted.

5 22. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, the method comprises:

10 performing a RRC reconfiguration under the control at least one Radio Network Controller.

23. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, the method comprises:

15 performing a RRC reconfiguration under the control at least one Radio Network Controller.

20 24. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, the method comprises:

25 sending a request for a Radio Resource Control connection from the user equipment to the serving Radio Network Controller.

25. A method as claimed in claim 24, wherein the request for a Radio Resource Control connection indicates the movement of the user equipment into said second cell as the cause of the request.

26. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, to a second cell in which the

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multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, the method comprises:

- establishing a Radio Resource Control connection for said user equipment; and
- said user equipment directly contacting a core network to trigger activation of the multimedia data service for said user equipment.

27. A method as claimed in claim 26, wherein said user equipment contacts said core network by means of a Routing Area Update message.

28. A method as claimed in claim 26, further comprising a dedicated channel for transmission of said multimedia data service data to said user equipment.

29. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, the method comprises:

- establishing a Radio Resource Control connection for said user equipment, such that said user equipment requires a serving Radio Network Controller;
- said user equipment directly contacting a core network to trigger activation of the multimedia data service for said user equipment; and
- establishing an Iu interface between a serving Radio Network Controller and a controlling Radio Network Controller for said user equipment.

30. A method as claimed in claim 29, further comprising:
- establishing a bearer connection from the core network to said serving Radio Network Controller for multimedia data service data; and
 - establishing a dedicated channel for transmitting the multimedia data service data on a point-to-point basis from said serving Radio Network Controller to said user equipment.

31. A method as claimed in claim 1, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is also provided on a point-to-point basis while requiring a Radio Resource Control connection, the method comprises:

performing a user equipment mobility procedure; and
informing a serving Radio Network Controller from a drift Radio Network
Controller that the multimedia data service is not to be provided on a point-to-multipoint
basis.

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32. A method of establishing a multimedia data service in a cell of a cellular
telecommunications network, the method comprising:

sending a request for the multimedia data service from user equipment to a core
network;

10 sending an activation request from the core network to a controlling radio network
controller of the user equipment;

in response to the activation request, establishing a bearer connection between
the controlling radio network controller of the user equipment and the core network;
and

15 transmitting the multimedia data service data from the controlling radio network
controller to the user equipment.

33. A method as claimed in claim 32, further comprising broadcasting configuration
information from the controlling radio network controller in said cell, identifying a
20 channel on which the multimedia data service data is transmitted.

34. A method of establishing a multimedia data service in a cell of a cellular
telecommunications network, the method comprising:

25 sending a request for the multimedia data service from user equipment to a core
network;

sending an activation request from the core network to a serving radio network
controller of the user equipment; and

30 sending a message from the serving radio network controller to a controlling
radio network controller of the user equipment to determine whether the multimedia
data service data will be transmitted on a point-to-point or point-to-multipoint basis in
said cell.

35 35. A method as claimed in claim 34, further comprising, when it is determined that
the multimedia data service data will be transmitted on a point-to-point basis in said
cell:

establishing a bearer connection between the serving radio network controller and the core network; and

transmitting the multimedia data service data from the serving radio network controller to the user equipment on a point-to-point basis.

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36. A method as claimed in claim 34 or 35, further comprising reconfiguring a radio link between the serving radio network controller and the controlling radio network controller of the user equipment.

10 37. A method as claimed in claim 34, further comprising, when it is determined that the multimedia data service data will be transmitted on a point-to-point basis in said cell, but is not already being transmitted:

establishing a bearer connection between the controlling radio network controller of the user equipment and the core network; and

15 transmitting the multimedia data service data from the controlling radio network controller to the user equipment on a point-to-multipoint basis.

38. User equipment, for receiving a multimedia data service in a cellular telecommunications network, wherein, when the user equipment moves from a first cell
20 in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the user equipment is adapted to send a SIGNALLING CONNECTION RELEASE INDICATION message from to the serving
25 Radio Network Controller.

39. User equipment as claimed in claim 38, wherein the SIGNALLING CONNECTION RELEASE INDICATION message indicates the movement of the user equipment into said second cell as the cause of the request.

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40. A radio network controller, for use in providing a multimedia data service in a cellular telecommunications network, wherein, when a user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, to a second cell in which the
35 multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the radio network controller is adapted to:

releasing the Radio Resource Control connection of said user equipment, such that said user equipment no longer requires a serving Radio Network Controller;

continue point-to-multipoint transmission of the multimedia data service data from a controlling Radio Network Controller for said user equipment; and

5 release an Iu interface between a previous serving Radio Network Controller and said controlling Radio Network Controller for said user equipment.

41. A radio network controller as claimed in claim 40, further adapted to:

10 determine whether said previous serving Radio Network Controller still requires a bearer connection to receive said multimedia data service data; and
if not, to release said bearer connection.

42. User equipment, for receiving a multimedia data service in a cellular telecommunications network, wherein, when the user equipment moves from a first cell
15 in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, the user equipment is adapted to:

20 send a request for a Radio Resource Control connection to a serving Radio Network Controller.

43. User equipment as claimed in claim 42, wherein the request for a Radio Resource Control connection indicates the movement of the user equipment into said second cell as the cause of the request.

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44. User equipment, for receiving a multimedia data service in a cellular telecommunications network, wherein when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, to a second cell in which the
30 multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, the user equipment is adapted to:

establish a Radio Resource Control connection; and
directly contact a core network to trigger activation of the multimedia data service for said user equipment.

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45. User equipment as claimed in claim 44, wherein said user equipment is adapted to contact said core network by means of a Routing Area Update message.

46. A core network node, for use in providing a multimedia data service in a cellular telecommunications network, wherein, when a user equipment moves from a first cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis while requiring a Radio Resource Control connection, and contacts the core network to trigger activation of the multimedia data service for said user equipment, the core network node is adapted to:

establish an Iu interface between a serving Radio Network Controller and a controlling Radio Network Controller for said user equipment; and

establish a bearer connection from the core network node to said serving Radio Network Controller for multimedia data service data; such that the multimedia data service data can be transmitted on a point-to-multipoint basis from said serving Radio Network Controller.

47. A radio network controller, for use in providing a multimedia data service in a cellular telecommunications network, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the radio network controller acting as a serving Radio Network Controller detects that the Radio Resource Control connection is no longer required.

48. A radio network controller as claimed in claim 47, wherein the Radio Network Controller is adapted to:

perform an attach to a drift Radio Network Controller; and

receive information from said drift Radio Network Controller that it is already providing the multimedia data service without requiring a Radio Resource Control connection.

49. A radio network controller as claimed in claim 47, wherein the Radio Network Controller is adapted to inform the user equipment that it should receive the multimedia data service data on a point-to-multipoint basis.
- 5 50. A radio network controller as claimed in claim 47, wherein the Radio Network Controller is adapted to inform the user equipment that it should release its existing radio access bearer for the receipt of the multimedia data service data on a point-to-point basis.
- 10 51. A radio network controller as claimed in claim 47, wherein the Radio Network Controller is adapted to inform the user equipment that it should release its existing Radio Resource Control connection.
52. User equipment, for receiving a multimedia data service in a cellular
15 telecommunications network, wherein, when the user equipment moves from a first cell in which the multimedia data service is provided on a point-to-point basis while requiring a Radio Resource Control connection, to a second cell in which the multimedia data service is provided on a point-to-multipoint basis without requiring a Radio Resource Control connection, the user equipment is adapted to:
20 detect that the Radio Resource Control connection is no longer required.
53. User equipment as claimed in claim 52, wherein the user equipment is adapted to detect that the Radio Resource Control connection is no longer required by monitoring the multimedia data service SIB.
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54. In a UMTS mobile communications network, comprising a Core Network and a UMTS Radio Access Network, a method of providing a multimedia data service, for user equipment which is capable of movement amongst a plurality of cells served by respective base stations of the Radio Access Network, wherein:
30 the Core Network informs the respective serving Radio Network Controller of the Radio Access Network about a user equipment that wants to receive a specific MBMS service;
the Core Network enables the Radio Access Network to track user equipment receiving MBMS services in RRC Connected Mode; and
35 the Radio Access Network determines whether to use point-to-multipoint, or point-to-point, transmission of data relating to said MBMS service, for users in RRC

Connected Mode.